MULTI-DIRECTIONAL TOWER FAN

FIELD OF THE INVENTION

The present invention relates to portable fans and, more particularly, to a tower fan having at least one rotatable housing portion to direct the flow of air in a different direction from that directed by another housing portion of the fan.

BACKGROUND OF THE INVENTION

Portable electric fans have been used extensively to enhance personal comfort by inducing air movement, and are generally intended to be placed on floors, counters or other surfaces. A common trait among portable fans is that they can be easily moved from one location to another without any more preparation than removing an electric cord from an outlet and physically relocating the fan device.

The most popular forms of portable electric fans include pedestal and box-type fans having propeller-like fan blades for blowing air in a direction parallel to the axis of rotation of the fan blade assembly. Recently becoming more popular are tower fans having an elongate housing oriented in a vertical direction and containing a cylindrical blower therein for blowing air in a direction perpendicular to the axis of rotation of the blower. Typically, air is drawn into one or more vertical surfaces of the longitudinal housing and is directed out a separate vertical surface by the cylindrical blower. These tower fans are desirable for their compact size and space requirements and, depending on the housing design, their efficient delivery of moving air.

Obviously, it is desirable for a fan to produce the maximum amount of air circulation and to distribute the circulating air over as wide an area as possible to provide maximum comfort in all portions of the room in which the fan is disposed. Unfortunately, both types of conventional fans often include a housing which is fixedly mounted or integrally formed on a supporting base, which causes the angular zone covered by the directed air to be fixed. Thus,

with these style fans, when the user wishes to alter the direction or angular zone of the directed air, the user must reposition the fan so as to face the desired target area.

One style of tower fan has been proposed wherein the air is drawn in from the bottom of a cylindrical fan housing and blown out through the entire circumferential surface of the housing in a 360° pattern. This style of tower fan is designed to be placed in the center of a room such that the air can be directed around the entire room. Aside from the obvious drawback of having to place the fan in the center of the room, another drawback with this type of tower fan is that air cannot be blown in a specified direction or within a certain desired angular range.

It is well known in the art to provide a fan with an oscillating mechanism so that the direction of the blown air can vary. For example, U.S. Patent No. 5,266,004 discloses a tower fan with an oscillating mechanism to provide a blower capable of selectively blowing air in a predetermined angular range or through an entire 360° pattern. Thus, the use of an oscillating mechanism on a standard fan enables the user to alter or enlarge the angular zone of the directed air such that a greater area is capable of being covered by the fan. However, there still remains a drawback to this style of fan, in that, as the direction of blown air oscillates from side to side, there will only be one area at any given time that receives the benefit of directed air until the fan returns to that area. Also, the angular zone of the directed air is fixed and cannot be altered by the user.

In commonly owned U.S. Patent No. 6,321,034, a portable heater is disclosed having two or more heating units that are rotatably attached to each other so as to direct the delivery of heat toward two or more separate directions. The rotatable heating units are independent of each other and contain their own separate heating elements and blowers. Thus, a heater is provided which allows the user to easily alter the angular zone of the emitted heat without depriving any of the intended area a continuous supply of heat.

Accordingly, it would be desirable to incorporate this multi-directional heat delivery concept into a portable fan in a simple and cost-effective manner. Moreover, it would be

desirable to provide such multi-directional capability to a tower fan so as to minimize space requirements and to maximize the efficiency of the circulated forced air.

OBJECTS AND SUMMARY OF THE INVENTION

It is an object of the present invention to provide a fan which has two or more separate housing sections which can direct the flow of air in different directions as desired.

It is a further object of the present invention to provide a tower fan which is portable and easy to use.

The multi-directional tower fan of the present invention generally includes a base for supporting the fan on a surface, a first housing attached to the base, a second housing rotatably attached to the first housing, a single elongate rotating blower extending within both the first and second housing and a motor for rotating the blower. The first and second housings both have an inlet opening, an outlet opening and an interior chamber. The interior chambers of the housings are axially aligned with each other and the blower extends from the interior chamber of the first housing to the interior chamber of the second housing to simultaneously force air out through the outlet openings of the first and second housings. By rotating the second housing with respect to the first housing, the air being forced out of the outlet opening of the first housing may be directed in a different direction than the air being forced out of the outlet opening of the second housing.

In a preferred embodiment, the first housing is rotatably attached to the base so that both housings may be pivoted. Also, the blower preferably has a longitudinal axis and the second housing is rotatably attached to the first housing about the longitudinal axis. In alternative embodiments, the second housing can be attached to the first housing along a vertical axis by a flanged coupling or by a pin and slot arrangement. In another preferred embodiment, the fan further includes an oscillating mechanism for rotating the second housing with respect to the first housing.

A preferred form of the multi-directional tower fan according to the present invention, as well as other embodiments, objects, features and advantages of this invention will be

apparent from the following detailed description of illustrative embodiments thereof, which is to be read in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a multi-directional tower fan formed in accordance with the present invention;

FIG. 2 is a perspective view of the fan of FIG. 1 wherein the upper housing section has been rotated with respect to the lower housing section;

FIG. 3 is a cross-sectional view of the fan shown in FIG. 1 taken along the line 3-3;

FIGs. 4a and 4b are detailed views of alternative embodiments of the interface between the upper and lower housing sections; and

FIG. 5 is a partial cut-away view of an oscillating mechanism for the housing sections of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention is described below as having two housing sections rotatably attached to each other about a common axis. This disclosure is in no way intended to be limited to a tower fan having only two directional housing sections rotatably attached to each other, and modification of the present fan to include more than two housing sections will be readily apparent to one skilled in the art given the following detailed description.

Referring now to the drawings, FIGs. 1-3 show a tower fan 10 formed in accordance with the present invention. The term "tower fan" is generally used to refer to a fan having a vertically oriented elongate shape and a base designed for supporting the fan on a horizontal surface. However, the present invention may take other forms including horizontal orientations and/or having ceiling and/or wall mountable bases.

The fan 10 generally includes a base 12 for supporting the fan on a surface, two or more housing sections 14 and 16, a blower 18 disposed within the housing sections and a

motor 20 for rotating the blower. Each housing section 14 and 16 includes an inlet opening 22, through which outside air is drawn into the housing section, and an outlet opening 24, through which air is forced by the blower 18. Preferably, the inlet and outlet openings 22 and 24 of the housings 14 and 16 are in the form of a grille having a plurality of small openings through which the air can travel. Each housing section 14 and 16 further define an interior chamber 26a and 26b containing the blower 18.

In the preferred embodiment, the first housing 14 is attached directly to the base 12 and the second housing 16 is rotatably attached to the top of the first housing for rotating in a direction indicated by arrow A in FIG. 2. The first housing 14 may be fixedly attached to the base 12 or it may be rotatably attached to the base for rotating in a direction indicated by arrow B in FIG. 2. The second housing 16 is attached to the first housing 14 so that the interior chamber 26a of the first housing is axially aligned with the interior chamber 26b of the second housing.

A single rotating blower 18 extends through the interior chambers 26a and 26b of both housings 14 and 16. The blower 18 used in conjunction with the preferred form of the present invention is an elongate cylindrical "squirrel cage" type blower having a plurality of vertically oriented vanes 19, which draw in air into the housing inlet openings 22 and forces air out through the housing outlet openings 24. The blower 18 may have a plurality of blower sections which are fixed, or otherwise coupled, together wherein the vanes 19 of each section are alternatingly spaced with respect to the vanes 19 of the adjacent blower section, as shown in FIG. 3. The blower 18 has a longitudinal axis 32, which, in the vertical tower fan embodiment 10 shown in the drawings, will be vertically oriented within both housings 14 and 16. Preferably, the housings 14 and 16 are rotatably attached to each other about the longitudinal axis 32 of the blower 18.

The rotating blower 18 is connected to and driven by the motor 20. The motor 20 can be connected to either end of the blower 18 and may be housed within the base 12, the first housing section 14 or the second housing section 16. The motor 20 rotates the blower 18 to simultaneously draw air in through the inlet openings 22a and 22b of both housings 14 and 16 and force air out through the outlet openings 24a and 24b of both housings. Because the first

and second housings 14 and 16 are rotatably attached to each other, the air being forced out of the first housing outlet opening 24a can be directed in a direction different than the air being forced out of the second housing outlet opening 24b.

The first and second housings 14 and 16 are preferably semi-circular in cross-section with the inlet opening 22 being provided on a circular peripheral surface 28 and the outlet opening 24 being provided on a flat peripheral surface 30. Each housing 14 and 16 may be formed in two separate sections, which are secured together after the blower 18, the motor 20 and associated electrical components are placed in their proper locations. Securing of the housing sections can be accomplished by any means known in the art, such as screws, glue, or a friction-fit, to name a few. Of course, the housings and openings can be different in configuration from those shown for functional and/or aesthetic purposes.

Referring now to FIG. 4a, which is a detailed view of the interface between the first housing section 14 and the second housing section 16, in a first embodiment, the second housing 16 is rotatably attached to the first housing 14 along the longitudinal axis 32 of the blower 18 by a flanged coupling 34. The flanged coupling 34 comprises an annular rim 36 which extends from the top surface 38 of the lower first housing 14 through an opening 40 located in the bottom surface 42 of the second housing 16 positioned directly above the first housing. The annular rim 36 further includes a radially extending flange 37. The flange 37 operates to secure the first housing 14 to the second housing 16 such that the housings cannot be separated.

Preferably, and as shown in FIG. 4a, the inside diameter of the annular rim 36 of the first housing 14 defines an opening 44 in the lower first housing. The openings 40 and 44 cooperate to provide a passageway connecting the interior chambers 26a and 26b of the first and second housings 14 and 16, such that the single elongate cylindrical blower 18 may rotate freely within both housings, as described above.

Although the coupling of the first housing 14 to the second housing 16 has been described as a flanged coupling 34 which extends from the first housing into the upper second housing, it is possible to reverse the components of the coupling such that the annular rim 36 descends from the upper second housing 16 into an opening on the lower first housing.

Additionally, the coupling used does not have to be a flanged coupling as described above, but rather can be any coupling which will allow the housings 14 and 16 to pivot or rotate with respect to each other.

For example, an alternative embodiment of the coupling is shown in FIG. 4b. Instead of a flanged coupling, a pin and slot arrangement 46 is provided. The pin and slot arrangement 46 comprises at least one pin 48 extending from the top surface 38 of the lower first housing 14 through at least one curved slot 50 formed in the bottom surface 42 of the second housing 16 positioned directly above the lower first housing. The length of the curved slot 50 therefore determines the range of rotation of the housings with respect to each other. A bolt 52 is threaded into the pin 48 to secure the first housing 14 to the second housing 16 such that the housings cannot be separated. Again, it is possible to reverse the components of the pin and slot arrangement such that the pin descends from the upper second housing 16 into a curved slot formed in the lower first housing.

The tower fan 10 of the present invention may further include an oscillating mechanism 54, as shown in FIG. 50, to convert an input motion, such as a circular or rotary motion from a motor, into oscillation. For the purposes of this discussion, oscillation will be understood to refer to a repetitive motion which causes at least one of the housings 14 and 16 to rotate with respect to the base 12 and thereby direct air in a repeating pattern of directions. Within this context, oscillation is a motion wherein a housing 14 and/or 16 rotates through an arc and subsequently moves in reverse direction through the same arc returning to its original position.

For example, the oscillating mechanism 54 may comprise a motor 56 having a shaft 57, a gear 58 attached to the shaft and having a plurality of teeth 59, and a track 60 having a plurality of teeth 61. As shown in FIG. 5, the motor 56 is attached to the upper second housing 16, the track 60 is provided on the top surface 38 of the lower first housing 14, and the gear 58 is positioned within the track. The actuation of the motor 56 causes the relative rotation of the gear 58 such that the 59 of the gear engage the teeth 61 of the track 60 and force the gear to follow the pattern of the track. Due to the fact that the motor 56 and gear 58 are attached to the upper second housing 16, the movement of the gear within the track 60

will cause the upper housing to oscillate with respect to the lower first housing 14. When the gear 58 reaches the limit of the track 60, it will change direction and force the second housing 16 to move in the reverse direction as that previously traveled. This oscillating mechanism 54 allows for the automatic rotation of the housings 14 and 16 with respect to each other about the longitudinal axis of the central blower 18. The oscillating mechanism described is but one mechanism which can be effectively utilized to oscillate one or both of the housings 14 and 16 with respect to the base 12. Other mechanisms can alternatively effectively provide for oscillation of the housings of the present invention.

As is typical of portable fans, power is conducted to the motor 20 from a power cord and plug (not shown). The components required to enable operation of a fan with a power cord and plug are well known in the art and need not be discussed in detail herein. As shown in the drawings, at least one operator interface 62 is provided. The operator interface 62 can be provided on either housing or on the base and may include an on/off switch, a speed selector, an oscillating selector and/or a display panel. All of the switches used in conjunction with the present invention can be touch, toggle, dial or button operated, the selection of switch type being a matter of design and cost considerations.

In the embodiments shown in FIGS. 1-5, the lower first housing 14 is attached to a base 12 for supporting the fan on a surface in a vertically oriented configuration. The base, however, can be an integral part of the first housing or can simply be the bottom portion of the first housing. Moreover, the tower fan 10 of the present invention can be further expanded to include additional fan housings rotationally attached to one another, with a longer blower extending through all of the housings, until the desired number of housings is obtained.

Thus, while the foregoing detailed description has disclosed what is presently believed to be the preferred embodiments of the invention, those skilled in the art will appreciate that other and further changes and modifications can be made without departing from the scope or spirit of the invention, and it is intended that all such other changes and modifications are included in and are within the scope of the invention as described in the appended claims.